



Technical Report Series on the Biosystem-Aerosphere Study (BOREAS)

William L. Munn and David E. Knapp, Editors

118

NASA AES MARSII

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**Technical Report Series on the
Boreal Ecosystem-Atmosphere Study (BOREAS)**

Forrest G. Hall and David E. Knapp, Editors

Volume 118

**BOREAS AES MARSII
Surface Meteorological Data**

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National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771

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BOREAS AES MARSII Surface Meteorological Data

G. Barrie Atkinson, Barry Funk

Summary

Canadian AES personnel collected several data sets related to surface and atmospheric meteorological conditions over the BOREAS region. This data set contains 15-minute meteorological data from six MARSII meteorology stations in the BOREAS region in Canada. Parameters include site, time, temperature, dewpoint, visibility, wind speed, wind gust, wind direction, two cloud groups, precipitation, and station pressure. Temporally, the data cover the period of May to September 1994. Geographically, the stations are spread across the provinces of Saskatchewan and Manitoba. The data are provided in tabular ASCII files, and are classified as AFM-Staff data.

Table of Contents

- 1) Data Set Overview
- 2) Investigator(s)
- 3) Theory of Measurements
- 4) Equipment
- 5) Data Acquisition Methods
- 6) Observations
- 7) Data Description
- 8) Data Organization
- 9) Data Manipulations
- 10) Errors
- 11) Notes
- 12) Application of the Data Set
- 13) Future Modifications and Plans
- 14) Software
- 15) Data Access
- 16) Output Products and Availability
- 17) References
- 18) Glossary of Terms
- 19) List of Acronyms
- 20) Document Information

1. Data Set Overview

1.1 Data Set Identification

BOREAS AES MARSII Surface Meteorological Data

1.2 Data Set Introduction

This data set contains 15-minute meteorological data from six Meteorological Automatic Reporting System II (MARSII) meteorology stations in the BOREal Ecosystem-Atmosphere Study (BOREAS) region in Canada. Parameters include site, time, temperature, dewpoint, visibility, wind speed, wind gust, wind direction, two cloud groups, precipitation, and station pressure. BOREAS received data for the Intensive Field Campaigns (IFCs) of 1994.

1.3 Objective/Purpose

These monitoring sites were established by Environment Canada to provide hourly weather reports to 1) provide input to the operational program of forecasts and warnings, 2) provide input to

operational weather prediction models, and 3) provide climate data. The frequency of observation was increased to 15 minutes at the request of BOREAS. Data collection for BOREAS occurred during IFCs 1, 2, and 3 in 1994.

1.4 Summary of Parameters

Parameters include site, time, temperature, dewpoint, visibility, wind speed, wind gust, wind direction, two cloud groups, precipitation, and station pressure.

1.5 Discussion

Generally, these stations were installed well before BOREAS began, and they conform to Environment Canada's criteria for accuracy and exposure.

1.6 Related Data Sets

BOREAS AFM07 SRC Surface Meteorological Data
BOREAS AES Campbell Scientific Surface Meteorological Data
BOREAS AES READAC Surface Meteorological Data

2. Investigator(s)

2.1 Investigator(s) Name and Title

G. Barrie Atkinson BOREAS AES Project Scientist

2.2 Title of Investigation

Environment Canada 15-Minute MARSII Data

2.3 Contact Information

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3. Theory of Measurements

None given.

4. Equipment

4.1 Sensor/Instrument Description

<u>Parameter</u>	<u>Instrument</u>	<u>Instrument Description</u>
Pressure	A	Negretti & Zambra aneroid barometer
Cloud	B	Atmospheric and Environment Service (AES) rotating beam ceilometer
	K	AES laser ceilometer Q1211
	L	AES laser ceilometer Q1212
Visibility	C	Sperry videograph, type B
Temperature	D	AES dewcel probe, type E
Radiation shield	E	wooden Stevenson screen, wooden stand
Precipitation:		
tipping bucket	F	AES tipping bucket rain gauge (TBRG) (summer only)
weighing gauge	G	Fischer & Porter (F&P) with F&P Nipher shield (winter only)
Wind:		
speed detector	H	AES/SD-B, MARS II type U2A
direction detector	I	AES/DD-C, MARS II type U2A
Tower	J	Hossick tilting

4.1.1 Collection Environment

The instrumentation was operated at ambient environmental conditions during the data period.

4.1.2 Source/Platform

The following table lists the instrumentation at the various MARSII stations by the codes given in Section 4.1.

<u>Instrument</u>	<u>Stations</u>					
	<u>WEQ</u>	<u>WDC</u>	<u>WJD</u>	<u>WOY</u>	<u>WSZ</u>	<u>WVT</u>
Pressure sensor	A	A	A	A	A	A
Cloud sensor	B	K	-	L	B	K
Visibility sensor	C	-	C	C	C	C
Temperature/dewpoint sensor	D	D	D	D	D	D
height (cm)	116	112	120	120	118	120
radiation shield	E	E	E	E	E	E
Precipitation:						
Tipping Bucket	F	F	F	F	F	F
rim height (cm)	75	75	75	75	75	75
Weighing gauge	G	-	-	G	-	-
rim height (cm)	230	-	-	201	-	-
Anemometer:						
speed sensor	H	H	H	H	H	H
cup height (m)	10	10	16	10	10	10
direction sensor	I	I	I	I	I	I
Tower	J	J	J	J	J	J

4.1.3 Source/Platform Mission Objectives

None given.

4.1.4 Key Variables

The key variables in these data are: site, time, temperature, dewpoint, visibility, wind speed, wind gust, wind direction, two cloud groups, precipitation, and station pressure.

4.1.5 Principles of Operation

None given.

4.1.6 Sensor/Instrument Measurement Geometry

None given.

4.1.7 Manufacturer of Sensor/Instrument

None given.

4.2 Calibration

4.2.1 Specifications

None given.

4.2.1.1 Tolerance

None given.

4.2.2 Frequency of Calibration

None given.

4.2.3 Other Calibration Information

None given.

5. Data Acquisition Methods

Since there is no provision for onboard storage of observations, each station was telephoned approximately every 15 minutes from a computer in Winnipeg.

6. Observations

6.1 Data Notes

Not applicable.

6.2 Field Notes

The following was obtained from the inspection books. Obviously some visits have not been recorded. Normal practice is to disable the TBRG for the winter and to disable the weighing gauge for the summer.

Location	Date of Visit	Actions During Visit
WEQ Swan River, MB	Inspection 21-Mar-1994	All instruments were cleaned and calibrated. Pressure averaged +0.235 mb different from the inspection barometer for 10 readings. Clouds were too high and too few to verify operation of the ceilometer. Temperature averaged 0.0 °C different from inspection psychrometer for 9 readings. The dewpoint was +1.2 deg °C different. A newly calibrated tipping bucket bridge was installed and checked. Bearings in both the speed and direction wind detectors were replaced.
	Visit 18-May-1995	F&P taken out of service and TBRG installed for the summer.
WDC Uranium City, SK	Inspection 06-Dec-1993	All instruments were cleaned and calibrated. Pressure averaged -0.42 mb different from the inspection barometer for 10 readings. The wind speed detector and the dewcel were changed as per their replacement schedule. The wind direction indicator was still in good condition.
WJD Grand Rapids, MB	Inspection 20-Apr-1993	All instruments were cleaned and calibrated. Pressure averaged -0.55 mb different from the inspection barometer. Air temperatures were within +/- 0.2 °C, and dewpoint temperatures were within +/- 0.7 degrees °C.
	Inspection 22-Jul-1994	All instruments were cleaned and calibrated. Pressure averaged +0.654 mb different from the inspection barometer.
	Inspection 29-Mar-1995	All instruments were cleaned and calibrated. Pressure averaged +0.71 mb different from the inspection barometer for six comparisons. The dewpoint was reading higher than temperature. The problem was traced to an out-of-alignment temperature bridge card, which was replaced with a spare. Then psychrometer/MARS II comparisons were well within limits.
	Visit 24-May-1995	TBRG installed for the summer.

WOY Wynard, SK	Inspection 20-Jul-1994	All instruments were cleaned and calibrated. The dewcel was changed. The amplifier in the videograph was replaced, and the videograph is now back in service.
	Inspection 24-Nov-1994	All instruments were cleaned and calibrated. The dewcel was changed. The aneroid barometer was replaced. The nipher shield was placed on the F&P, and it is now in service. The TBRG was removed for the winter.
WSZ Fisher Branch, MB	Inspection 17-Mar-1993	All instruments were cleaned and calibrated. Pressure averaged -0.25 mb different from the inspection barometer for 10 comparisons. Temperature comparisons were within 0.2 degrees C and the dewpoint was within 1.0 degrees C.
	Visit 21-Apr-1995	The TBRG was installed for the summer.
WVT Buffalo Narrows SK	Inspection 20-Jul-1992	All instruments were cleaned and calibrated. Temperature comparisons were on average -0.2 degrees C and the dewpoint was on average +0.2 degrees C. Wind speed detector was replaced.
	Inspection 12-Aug-1994	All instruments were cleaned and calibrated, and found to be within limits. Wind speed detector was replaced. TBRG was leveled.
	Visit 22-Nov-1994	Wind system was malfunctioning. Wind speed detector was replaced. TBRG was taken out of service for the winter.
	Inspection 12-Dec-1994	All instruments were cleaned and calibrated, and found to be within limits.

7. Data Description

7.1 Spatial Characteristics

7.1.1 Spatial Coverage

The following is a list of stations covered by the data. Latitude and longitude are given in degrees and minutes under the North American Datum of 1983 (NAD83). A brief description of each station follows.

ID	Name	Latitude	Longitude	Elevation (meters)
WEQ	Swan River, MB	52° 07' N	101° 14' W	334.8
WDC	Uranium City, SK	59° 34' N	108° 29' W	318.2
WJD	Grand Rapids, MB	53° 11' N	99° 16' W	222.5
WOY	Wynard, SK	51° 46' N	104° 12' W	560.1
WSZ	Fisher Branch, MB	51° 05' N	97° 33' W	253.0
WVT	Buffalo Narrows, SK	55° 50' N	108° 26' W	434.0

WEQ Swan River, MB

The autostation is located at the Swan River Airport in the Swan River Valley. Exposure is open in all directions. Instruments are located on a level, grassed surface. The Valley runs in a southwest to northeast direction with the Porcupine Mountains to the north-northwest and the Duck Mountains to the south-southeast. The Valley bottom is fairly flat cropland with the occasional bluff of trees.

WDC Uranium City, SK

The instrument area is located on a 23-m-wide strip of grass running northeast from the airport terminal building. This grassy area is sandwiched between a gravel vehicle parking area to the southeast and a paved aircraft parking ramp to the northwest. The instrument exposure is fair, with some sheltering to the northeast by the Eldorado warehouse and to the west by the air terminal building. Airflow from the north and south is generally unrestricted, although the south side of the instrument area is bounded by a 2-m security fence. The instruments are subject to occasional "propwash" from aircraft in the parking area immediately to the north. The airport is located approximately 15 km to the north of Lake Athabaska, and the surrounding countryside is quite hilly, and covered with evergreen and birch trees. Numerous small lakes dot the area.

WJD Grand Rapids, MB

The site is located in the town of Grand Rapids, just north of the intersection of the main thoroughfare of the town and Highway #6. Instrument exposure is very good. Instruments are located in a 30-m-square area surrounded by a 1.2-m-high chain link fence. Low brush has been cleared to a distance of approximately 60 m in all directions. The surrounding terrain is flat, with mixed forest, scrub bush, and muskeg. The mouth of the Saskatchewan River, where it flows into the north basin of Lake Winnipeg, is approximately 1 km to the southeast. These two bodies of water, particularly open water on faster flowing sections of the river, contribute to high year-round humidities, frequent fog conditions, and heavy hoarfrost in the winter months. The wind exposure is excellent in all directions because the 16-m wind mast extends well above the surrounding treetops. In addition, the nearest tall trees (5-10 m) are at least 70 m away.

WOY Wynard, SK

The autostation is located at 505 5th St. W, at the corner of 5th St and Highway #16, in the southwest corner of the town of Wynard (population approximately 2200). The station is situated on a parcel of land that is approximately 98 m (north-south) by 152 m (east-west), grassed, and surrounded by a fence. Buildings from the former manned program are at the west end of the property, and the instruments are located in a 30-m by 30-m plot near the center of the property, with the wind tower near the east end. The immediate surroundings are: North - residential street, mostly one-story single family dwellings; East - open school yard; South - Provincial Highway #16; and West - the local golf course. Farther out to the north and east are residential and business districts. Farther to the south and west is mostly open crop and pasture land. The Quill lakes are located to the west and northwest, with the closest shoreline approximately 8 km away. These lakes are very shallow and can produce local low clouds during periods of northwest winds. The local terrain is mostly gently rolling farmland, open except for an occasional farm shelterbelt or small wooded area in a depression. The topography has a gentle slope from the Touchwood Hills (elevation 670 m) some 10 km to the south, to the shores of the Quill lakes to the northwest (elevation 533 m). The site offers an excellent exposure from all directions and is representative of the area.

WSZ Fisher Branch, MB

The station is situated at the southeast end of the 240-m (north-south) by 90-m (east-west) AES reserve. The instrument area is a 25-m-square grass on gravel area in a rural setting and has good exposure. The reserve has been cleared of trees, but a line of trees borders the reserve on the western and northern edges. The surrounding countryside is generally flat farmland, with about 30% tree coverage. Lake Winnipeg lies about 50 km to the east and Lake Manitoba about 70 km to the west.

WVT Buffalo Narrows, SK

The autostation instruments are colocated with the manned site on a large (60 by 60 m) grass-covered area surrounded by a wire security fence situated along the southwest side of the Buffalo Narrows airport. The airport is located on a broad peninsula that extends northeastward into Churchill Lake. Topography within a 30-km radius is 50% thickly treed bush and muskeg, and 50% large and small lakes of the Churchill River system. The wind tower is located near the runway, with open exposure in all directions.

7.1.2 Spatial Coverage Map

Not available.

7.1.3 Spatial Resolution

These data represent point measurements at the given locations.

7.1.4 Projection

Not applicable.

7.1.5 Grid Description

Not applicable.

7.2 Temporal Characteristics

7.2.1 Temporal Coverage

Data were collected at the sites from 24-May-1994 through 25-Jun-1994, from 18-Jul-1994 through 18-Aug-1994, and from 25-Aug-1994 through 20-Sep-1994.

7.2.2 Temporal Coverage Map

Not available.

7.2.3 Temporal Resolution

Data are reported approximately every 15-minutes.

7.3 Data Characteristics

7.3.1 Parameter/Variable

The parameters contained in the data files on the CD-ROM are:

```

      Column Name
-----
SITE_NAME
SUB_SITE
DATE_OBS
TIME_OBS
AIR_TEMP_1_5M
DEW_TEMP_1_5M
MEAN_WIND_SPEED_10M_10MIN
VISIBILITY_INDEX
GUST_10M_10MIN
MEAN_WIND_DIR_10M_10MIN
CLOUD_GROUP_1
CLOUD_GROUP_2
ACCUM_PRECIP_TIP
STN_PRESS
CRTFCN_CODE
REVISION_DATE
```

7.3.2 Variable Description/Definition

The descriptions of the parameters contained in the data files on the CD-ROM are:

Column Name	Description
SITE_NAME	The identifier assigned to the site by BOREAS, in the format SSS-TTT-CCCCC, where SSS identifies the portion of the study area: NSA, SSA, REG, TRN, and TTT identifies the cover type for the site, 999 if unknown, and CCCCC is the identifier for site, exactly what it means will vary with site type.
SUB_SITE	The identifier assigned to the sub-site by BOREAS, in the format GGGGG-IIIII, where GGGGG is the group associated with the sub-site instrument, e.g. HYD06 or STAFF, and IIIII is the identifier for sub-site, often this will refer to an instrument.
DATE_OBS	The date on which the data were collected.
TIME_OBS	The Greenwich Mean Time (GMT) when the data were collected.
AIR_TEMP_1_5M	The instantaneous air temperature at a height of 1.5 meters above the surface.
DEW_TEMP_1_5M	The instantaneous dewpoint temperature at a height of 1.5 meters above the surface.
MEAN_WIND_SPEED_10M_10MIN	The ten minute mean wind speed at a height of ten meters above the surface.
VISIBILITY_INDEX	The visibility index. This value is a number that can be converted to an approximate visibility in nautical miles. The following table can be used to do this conversion.

Actual Visibility (nautical miles)	Ranges of Values in Data	
	WITH PRECIPITATION	NO PRECIPITATION
9.+	961-999 & 0-96	961-999 & 0-96
8.	97-110	97-110
7.	111-125	111-125
6.	126-144	126-144
5.	145-166	145-166
4.5	167-178	167-178
4.	179-193	179-193
3.5	194-209	194-209
3.	210-229	210-229
2.5	230-246	230-252
2.	247-264	253-282
1.8	265-272	283-296
1.6	273-282	297-312
1.4	283-293	313-330
1.2	294-305	331-352
1.0	306-319	353-378
0.9	320-328	379-393
0.8	329-337	394-411
0.7	338-348	412-431
0.6	349-360	432-455

0.5	361-375	456-484
0.4	376-393	485-521
0.3	394-416	522-570
0.2	417-448	571-645
0.1	449-504	646-794
0.0	505-960	795-960

Note: The "NO PRECIPITATION" values are used only when there is explicit input from the TBRG to indicate that NO precipitation has fallen. e.g. during the winter or at any other time when the precipitation sensor has been removed from the station configuration, use the "WITH PRECIPITATION" column.

GUST_10M_10MIN	The maximum wind speed over the past ten minutes at a height of ten meters above the surface.
MEAN_WIND_DIR_10M_10MIN	The ten minute mean wind direction at a height of ten meters above the surface.
CLOUD_GROUP_1	The first two digits denote the height of the last detected cloud in hundreds of feet within the last six minutes. The next digit can be a 1 if cloud is overhead at the time of observation, or a 0 if no cloud. The last digit denotes the percentage of time, in tens of percent, that clouds were detected overhead during the previous hour.
	ChChCwC% (Field is 4 numbers long)
	ChCh Height of last detected cloud (100s feet) within the last 6 minutes
	Cw 1 = cloud overhead at time of observation; 0 = no cloud
	C% 10s percent of time cloud detected overhead during previous hour
CLOUD_GROUP_2	The first digit is for the 0 to 500 feet layer (0 to 174 meters), the second is for the 501 to 1000 feet layer (174 to 348 meters), the third is for the 1001 to 2000 feet layer (348 to 610 meters), and the fourth is for above 2001 feet (610 meters). A 0 in any place (layer) denotes no cloud in that layer in the last fifty minutes or more, a 1 denotes no cloud in the past forty minutes or more, a 2 denotes no cloud in the past thirty minutes or more, a 3 denotes no cloud in the past twenty minutes or more, a 4 denotes no cloud in the past ten minutes or more, a 5 means that cloud became either significant or insignificant within the last ten minutes, a 6 denotes cloud detected for the past ten minutes or more, a 7 denotes cloud detected for the past twenty minutes or more, a 8 denotes cloud detected for the past thirty minutes or more, a 9

denotes cloud detected for the past forty minutes or more.

C1C2C3C4 (Field is 4 numbers long)

HEIGHTS

C1 0 - 500 feet
C2 501 - 1000 feet
C3 1001 - 2000 feet
C4 above 2001 feet

NUMBERS any number can appear in any height

0 - no cloud in the past 50 minutes or more
1 - no cloud in the past 40 minutes or more
2 - no cloud in the past 30 minutes or more
3 - no cloud in the past 20 minutes or more
4 - no cloud in the past 10 minutes or more
5 - transition - cloud became significant or insignificant in the last 10 minutes
6 - cloud detected for the past 10 minutes or more
7 - cloud detected for the past 20 minutes or more
8 - cloud detected for the past 30 minutes or more
9 - cloud detected for the past 40 minutes or more

ACCUM_PRECIP_TIP

The amount of liquid precipitation that has fallen since a relative date.

STN_PRESS

The measured instantaneous atmospheric pressure at station level.

CRTFCN_CODE

The BOREAS certification level of the data.

Examples are CPI (Checked by PI), CGR (Certified by Group), PRE (Preliminary), and CPI-??? (CPI but questionable).

REVISION_DATE

The most recent date when the information in the referenced data base table record was revised.

7.3.3 Unit of Measurement

The measurement units for the parameters contained in the data files on the CD-ROM are:

Column Name	Units
SITE_NAME	[none]
SUB_SITE	[none]
DATE_OBS	[DD-MON-YY]
TIME_OBS	[HHMM GMT]
AIR_TEMP_1_5M	[degrees Celsius]
DEW_TEMP_1_5M	[degrees Celsius]
MEAN_WIND_SPEED_10M_10MIN	[meters][second ⁻¹]
VISIBILITY_INDEX	[none]
GUST_10M_10MIN	[meters][second ⁻¹]
MEAN_WIND_DIR_10M_10MIN	[degrees true North]

CLOUD_GROUP_1	[none]
CLOUD_GROUP_2	[none]
ACCUM_PRECIP_TIP	[millimeters]
STN_PRESS	[kiloPascals]
CRTFCN_CODE	[none]
REVISION_DATE	[DD-MON-YY]

7.3.4 Data Source

The sources of the parameter values contained in the data files on the CD-ROM are:

Column Name	Data Source
SITE_NAME	[Assigned by BORIS]
SUB_SITE	[Assigned by BORIS]
DATE_OBS	[Supplied by Investigator]
TIME_OBS	[Supplied by Investigator]
AIR_TEMP_1_5M	[Supplied by Investigator]
DEW_TEMP_1_5M	[Supplied by Investigator]
MEAN_WIND_SPEED_10M_10MIN	[Supplied by Investigator]
VISIBILITY_INDEX	[Supplied by Investigator]
GUST_10M_10MIN	[Supplied by Investigator]
MEAN_WIND_DIR_10M_10MIN	[Supplied by Investigator]
CLOUD_GROUP_1	[Supplied by Investigator]
CLOUD_GROUP_2	[Supplied by Investigator]
ACCUM_PRECIP_TIP	[Supplied by Investigator]
STN_PRESS	[Supplied by Investigator]
CRTFCN_CODE	[Assigned by BORIS]
REVISION_DATE	[Assigned by BORIS]

7.3.5 Data Range

The following table gives information about the parameter values found in the data files on the CD-ROM.

Column Name	Minimum Data Value	Maximum Data Value	Missng Data Value	Unrel Data Value	Below Detect Limit	Data Not Cllctd
SITE_NAME	REG-999-WDC04	REG-999-WVT04	None	None	None	None
SUB_SITE	STAFF-AES04	STAFF-AES04	None	None	None	None
DATE_OBS	24-MAY-94	20-SEP-94	None	None	None	None
TIME_OBS	0	2359	None	None	None	None
AIR_TEMP_1_5M	0	40.8	None	None	None	None
DEW_TEMP_1_5M	-.1	52	None	None	None	None
MEAN_WIND_SPEED_10M_10MIN	0	51.286	-999	None	None	None
VISIBILITY_INDEX	0	999	None	None	None	None
GUST_10M_10MIN	0	51.286	-999	None	None	None
MEAN_WIND_DIR_10M_10MIN	0	359	None	None	None	None
CLOUD_GROUP_1	0000	S000	-999	None	None	None
CLOUD_GROUP_2	0000	Z000	-999	None	None	None
ACCUM_PRECIP_TIP	0	1960.6	None	None	None	None
STN_PRESS	9.82	100.05	-999	None	None	None
CRTFCN_CODE	CPI	CPI	None	None	None	None

REVISION_DATE	19-DEC-95	22-JUN-98	None	None	None	None
Minimum Data Value	--	The minimum value found in the column.				
Maximum Data Value	--	The maximum value found in the column.				
Missng Data Value	--	The value that indicates missing data. This is used to indicate that an attempt was made to determine the parameter value, but the attempt was unsuccessful.				
Unrel Data Value	--	The value that indicates unreliable data. This is used to indicate an attempt was made to determine the parameter value, but the value was deemed to be unreliable by the analysis personnel.				
Below Detect Limit	--	The value that indicates parameter values below the instruments detection limits. This is used to indicate that an attempt was made to determine the parameter value, but the analysis personnel determined that the parameter value was below the detection limit of the instrumentation.				
Data Not Cllctd	--	This value indicates that no attempt was made to determine the parameter value. This usually indicates that BORIS combined several similar but not identical data sets into the same data base table but this particular science team did not measure that parameter.				
Blank	--	Indicates that blank spaces are used to denote that type of value.				
N/A	--	Indicates that the value is not applicable to the respective column.				
None	--	Indicates that no values of that sort were found in the column.				

7.4 Sample Data Record

The following are wrapped versions of data record from a sample data file on the CD-ROM.

```
SITE_NAME, SUB_SITE, DATE_OBS, TIME_OBS, AIR_TEMP_1_5M, DEW_TEMP_1_5M,
MEAN_WIND_SPEED_10M_10MIN, VISIBILITY_INDEX, GUST_10M_10MIN,
MEAN_WIND_DIR_10M_10MIN, CLOUD_GROUP_1, CLOUD_GROUP_2, ACCUM_PRECIP_TIP, STN_PRESS,
CRTFCN_CODE, REVISION_DATE
'REG-999-WSZ04', 'STAFF-AES04', 01-JUN-94, 2, 19.6, 5.4, 5.756, 8, 8.479, 329, '0000',
'0000', 21.2, 98.72, 'CPI', 19-DEC-95
'REG-999-WSZ04', 'STAFF-AES04', 01-JUN-94, 17, 20.0, 6.6, 4.676, 8, 7.349, 328, '0000',
'0000', 21.2, 98.72, 'CPI', 19-DEC-95
```

8. Data Organization

8.1 Data Granularity

The smallest unit of data is a monthly set of 15-minute records for one station.

8.2 Data Format(s)

The Compact Disk-Read-Only Memory (CD-ROM) files contain American Standard Code for Information Interchange (ASCII) numerical and character fields of varying length separated by commas. The character fields are enclosed with single apostrophe marks. There are no spaces between the fields.

Each data file on the CD-ROM has four header lines of Hyper-Text Markup Language (HTML)

code at the top. When viewed with a Web browser, this code displays header information (data set title, location, date, acknowledgments, etc.) and a series of HTML links to associated data files and related data sets. Line 5 of each data file is a list of the column names, and line 6 and following lines contain the actual data.

9. Data Manipulations

9.1 Formulae

None given.

9.1.1 Derivation Techniques and Algorithms

Not applicable.

9.2 Data Processing Sequence

9.2.1 Processing Steps

Data were received by BOREAS in raw form with 1 month's worth of data per station contained in each raw file. They were extracted from the files using a C program provided by AES. The output of this program was a tab-delimited file that contained 1 month's worth of processed data for one station. BOREAS Information System (BORIS) personnel loaded these data into a relational data base and converted the units as needed to match those of other data sets.

9.2.2 Processing Changes

'RAW' data had many extraneous characters that were removed. The records were checked for completeness.

9.3 Calculations

No calculations were performed on the data.

9.3.1 Special Corrections/Adjustments

None given.

9.3.2 Calculated Variables

None given.

9.4 Graphs and Plots

None given.

10. Errors

10.1 Sources of Error

Snow measurements (Fisher) are known to be poor.

10.2 Quality Assessment

10.2.1 Data Validation by Source

None given.

10.2.2 Confidence Level/Accuracy Judgment

None given.

10.2.3 Measurement Error for Parameters

None given.

10.2.4 Additional Quality Assessments

None given.

10.2.5 Data Verification by Data Center

An automated quality assurance program was run on this data set to identify anomalies, including sudden jumps or drops ("spikes") in the data. Some of these problems are identified in Section 11.2.

11. Notes

11.1 Limitations of the Data

None given.

11.2 Known Problems with the Data

AIR_TEMP_1_5_M

Prob	SITE_NAME	SUB_SITE	From DATE_OBS	To DATE_OBS	Data
Spike	REG-999-WOY04	STAFF-AES04	05-JUN-94	05-JUN-94	20.5 - 40.8
Spike	REG-999-WOY04	STAFF-AES04	05-JUN-94	05-JUN-94	40.8 - 18

DEW_TEMP_1_5_M

Some large spikes were identified for these data at the WDC and WVT sites. These high values are most likely not valid.

Spike	REG-999-WDC04	STAFF-AES04	05-AUG-94	06-AUG-94	17.2 - 52
Spike	REG-999-WDC04	STAFF-AES04	06-AUG-94	06-AUG-94	52 - 17.1
High	REG-999-WDC04	STAFF-AES04	06-AUG-94	06-AUG-94	52
Spike	REG-999-WVT04	STAFF-AES04	22-JUL-94	22-JUL-94	26.1 - 9.8
Spike	REG-999-WVT04	STAFF-AES04	30-JUL-94	30-JUL-94	15.2 - 51.3
Spike	REG-999-WVT04	STAFF-AES04	30-JUL-94	30-JUL-94	51.3 - 22.6
High	REG-999-WVT04	STAFF-AES04	30-JUL-94	30-JUL-94	51.3

MEAN_WIND_SPEED_10M_10MIN

There was an intermittent problem from May 1994 to September 1994 at WEQ. The values greater than 51 are probably not valid.

Spike	REG-999-WEQ04	STAFF-AES04	27-MAY-94	27-MAY-94	51.286 - .668
High	REG-999-WEQ04	STAFF-AES04	27-MAY-94	27-MAY-94	51.286

There was an intermittent problem from 31-Aug-1994 to 04-Sep-1994 at WVT.

Spike	REG-999-WVT04	STAFF-AES04	31-AUG-94	31-AUG-94	0 - 51.235
High	REG-999-WVT04	STAFF-AES04	31-AUG-94	31-AUG-94	51.235
Spike	REG-999-WVT04	STAFF-AES04	31-AUG-94	31-AUG-94	51.183 - 1.285
High	REG-999-WVT04	STAFF-AES04	31-AUG-94	31-AUG-94	51.183

VISIBILITY_INDEX

This column contains many spikes. One example of this is listed below. Users should be cautious about using this parameter. See Section 7.3.2 for more information.

Spike		REG-999-WSZ04		STAFF-AES04		20-SEP-94		20-SEP-94		994	-	5
-------	--	---------------	--	-------------	--	-----------	--	-----------	--	-----	---	---

GUST_10M_10MIN

A number of spikes were found at the WEQ site that appear to be related to the wind speed spikes at this site. Similar spikes were found at the WJD and WVT sites.

Spike		REG-999-WEQ04		STAFF-AES04		02-SEP-94		02-SEP-94		51.286	-	.617
High		REG-999-WEQ04		STAFF-AES04		02-SEP-94		02-SEP-94		51.286		

MEAN_WIND_DIR_10M_10MIN

No serious problems were found with these data.

ACCUM_PRECIP_TIP

Extremely large values greater than 1900 were found for the WEQ and WVT sites.

Spike		REG-999-WEQ04		STAFF-AES04		03-AUG-94		03-AUG-94		1944.6	-	17.8
High		REG-999-WEQ04		STAFF-AES04		03-AUG-94		03-AUG-94		1944.6		
Spike		REG-999-WVT04		STAFF-AES04		21-JUN-94		21-JUN-94		106.4	-	1927.2
Spike		REG-999-WVT04		STAFF-AES04		21-JUN-94		21-JUN-94		1927.2	-	106.4

STN_PRESS

Extremely low values were seen in the data for the WDC and WVT sites.

Spike		REG-999-WDC04		STAFF-AES04		03-AUG-94		03-AUG-94		9.87	-	98.74
Low		REG-999-WDC04		STAFF-AES04		03-AUG-94		03-AUG-94		9.87		

The original data appears to have a missing digit. The 9.87 value should probably be 98.70.

Spike		REG-999-WVT04		STAFF-AES04		17-JUN-94		17-JUN-94		26.96	-	96.95
Low		REG-999-WVT04		STAFF-AES04		17-JUN-94		17-JUN-94		26.96		

It is assumed that the value of 26.96 should really be 96.96.

11.3 Usage Guidance

None given.

11.4 Other Relevant Information

None given.

12. Application of the Data Set

These data in conjunction with other surface meteorological data can be used to monitor and model the near-surface conditions on a diurnal and seasonal basis.

13. Future Modifications and Plans

None given.

14. Software

14.1 Software Description

A C program from AES was used for unpacking and converting RAW data files.

14.2 Software Access

Contact:

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(204) 984-2072 (fax)
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15. Data Access

The AES MARSII surface meteorological data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

15.1 Contact Information

For BOREAS data and documentation please contact:

ORNL DAAC User Services
Oak Ridge National Laboratory
P.O. Box 2008 MS-6407
Oak Ridge, TN 37831-6407
Phone: (423) 241-3952
Fax: (423) 574-4665
E-mail: ornldaac@ornl.gov or ornl@eos.nasa.gov

15.2 Data Center Identification

Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) for Biogeochemical Dynamics
<http://www-eosdis.ornl.gov/> [Internet Link].

15.3 Procedures for Obtaining Data

Users may obtain data directly through the ORNL DAAC online search and order system [<http://www-eosdis.ornl.gov/>] and the anonymous FTP site [<ftp://www-eosdis.ornl.gov/data/>] or by contacting User Services by electronic mail, telephone, fax, letter, or personal visit using the contact information in Section 15.1.

15.4 Data Center Status/Plans

The ORNL DAAC is the primary source for BOREAS field measurement, image, GIS, and hardcopy data products. The BOREAS CD-ROM and data referenced or listed in inventories on the CD-ROM are available from the ORNL DAAC.

16. Output Products and Availability

16.1 Tape Products

None.

16.2 Film Products

None.

16.3 Other Products

These data are available on the BOREAS CD-ROM series.

17. References

17.1 Platform/Sensor/Instrument/Data Processing Documentation

None given.

17.2 Journal Articles and Study Reports

Newcomer, J., D. Landis, S. Conrad, S. Curd, K. Huemmrich, D. Knapp, A. Morrell, J. Nickeson, A. Papagno, D. Rinker, R. Strub, T. Twine, F. Hall, and P. Sellers, eds. 2000. Collected Data of The Boreal Ecosystem-Atmosphere Study. NASA. CD-ROM.

Sellers, P. and F. Hall. 1994. Boreal Ecosystem-Atmosphere Study: Experiment Plan. Version 1994-3.0, NASA BOREAS Report (EXPLAN 94).

Sellers, P. and F. Hall. 1996. Boreal Ecosystem-Atmosphere Study: Experiment Plan. Version 1996-2.0, NASA BOREAS Report (EXPLAN 96).

Sellers, P., F. Hall, and K.F. Huemmrich. 1996. Boreal Ecosystem-Atmosphere Study: 1994 Operations. NASA BOREAS Report (OPS DOC 94).

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Sellers, P., F. Hall, H. Margolis, B. Kelly, D. Baldocchi, G. den Hartog, J. Cihlar, M.G. Ryan, B. Goodison, P. Crill, K.J. Ranson, D. Lettenmaier, and D.E. Wickland. 1995. The boreal ecosystem-atmosphere study (BOREAS): an overview and early results from the 1994 field year. *Bulletin of the American Meteorological Society*. 76(9):1549-1577.

Sellers, P.J., F.G. Hall, R.D. Kelly, A. Black, D. Baldocchi, J. Berry, M. Ryan, K.J. Ranson, P.M. Crill, D.P. Lettenmaier, H. Margolis, J. Cihlar, J. Newcomer, D. Fitzjarrald, P.G. Jarvis, S.T. Gower, D. Halliwell, D. Williams, B. Goodison, D.E. Wickland, and F.E. Guertin. 1997. BOREAS in 1997: Experiment Overview, Scientific Results and Future Directions. *Journal of Geophysical Research* 102(D24): 28,731-28,770.

17.3 Archive/DBMS Usage Documentation

None.

18. Glossary of Terms

None.

19. List of Acronyms

AES	- Atmospheric and Environment Service
AFM	- Airborne Fluxes and Meteorology
ASCII	- American Standard Code for Information Interchange
BOREAS	- BOReal Ecosystem-Atmosphere Study
BORIS	- BOREAS Information System
CD-ROM	- Compact Disk-Read-Only Memory
CGR	- Certified by Group
CPI	- Checked by PI
CPI-???	- CPI but questionable
DAAC	- Distributed Active Archive Center
EOS	- Earth Observing System
EOSDIS	- EOS Data and Information System
F&P	- Fisher & Porter
GIS	- Geographic Information System
GMT	- Greenwich Mean Time
GSFC	- Goddard Space Flight Center
HTML	- HyperText Markup Language
IFC	- Intensive Field Campaign
MARSII	- Meteorological Automatic Reporting System II
MB	- Manitoba
NAD83	- North American Datum of 1983
NASA	- National Aeronautics and Space Administration
NSA	- Northern Study Area
ORNL	- Oak Ridge National Laboratory
PANP	- Prince Albert National Park
PI	- Principal Investigator
PRE	- Preliminary
READAC	- Remote Environmental Automated Data Acquisition Concept
SK	- Saskatchewan
SSA	- Southern Study Area
T/RH	- Temperature / Relative Humidity
TBRG	- Tipping Bucket Rain Gauge
URL	- Uniform Resource Locator

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When using these data, please include the following acknowledgment as well as citations of relevant papers in Section 17.2:

These data were collected by the Atmospheric Environment Service of Environment Canada. The efforts of AES in providing these data are greatly appreciated.

If using data from the BOREAS CD-ROM series, also reference the data as:

Atkinson, G.B., "Environment Canada 15-Minute MARSII Data." In *Collected Data of The Boreal Ecosystem-Atmosphere Study*. Eds. J. Newcomer, D. Landis, S. Conrad, S. Curd, K. Huemmrich, D. Knapp, A. Morrell, J. Nickeson, A. Papagno, D. Rinker, R. Strub, T. Twine, F. Hall, and P. Sellers. CD-ROM. NASA, 2000.

Also, cite the BOREAS CD-ROM set as:

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20.5 Document Curator

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